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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TAKASHI MAEDA,
YUJI KAWABUCHI, TAKAHIRO HAGA,
and TOMIJI HOSOTSUBO

Appeal 2008-3647
Application 10/656,147
Technology Center 1700

Decided: September 4, 2008

Before EDWARD C. KIMLIN, THOMAS A. WALTZ, and
CATHERINE Q. TIMM, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 10-22. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

I. BACKGROUND

The invention relates to a method of preparing an electric double layer capacitor using a mesophase pitch based activated carbon fiber. Claim 10 is illustrative:

> 10. A method of preparing an electric double layer capacitor, comprising
>
> preparing carbon fibers by:
>
> (i) carbonizing a mesophase pitch based infusibilized fiber at 600° to 900° C,
>
> (ii) activating the thus obtained carbon fiber in the presence of alkali, thereby obtaining a meso-phase pitch based active carbon fiber having a BET specific surface area of 30 to 1000 m^2/g whose pores consist essentially of micropores having an average pore radius of 0.2 to 1 nm;
>
> forming positive and negative electrode material by formulating a mixture of said activated carbon fibers, conductive carbon black and a binder and applying the mixture to a solid conductive metal support;
>
> positioning the positive and negative electrodes so formed in non-contacting relationship in a container with an electrolyte; and subjecting the positive and negative electrodes to a charge/discharge treatment in which the capacitor is charged at constant current density at an increasing voltage until the voltage exceeds 2.5 V up to 3.5 V, thereby forming an electric double layer at the interfaces of the electrodes of the capacitor and the electrolyte and thereafter discharging the capacitor at a constant current density.

On review is the Examiner's rejection of claims 10-22 under 35 U.S.C. § 103(a) as unpatentable over Maeda (US 6,118,650 issued Sep. 12, 2000 to Maeda et al.) in view of Anani (US 5,439,756 issued Aug. 8, 1995 to Anani et al.), Neat (US 5,030,523 issued Jul. 9, 1991 to Neat et al.), and Appellants' Admissions (Spec. 33).

Appellants present separate arguments for claims 10 and 11 (Br. 3-11), therefore, we select these two claims as representative for deciding the issues on appeal. The other claims stand or fall with the claim from which they depend.

II. DISCUSSION

Claim 10

Appellants' arguments as presented in their Brief and Reply Brief focus on the last step of claim 10, particularly, the portion of the last step directed to subjecting the positive and negative electrodes to a charge/discharge treatment (Br. 3-7; Reply Br. 1-2).[1] Appellants contend that the Examiner erred in finding that the Specification admits that the claimed charge/discharge step was known in the art (Br. 4), that the charge/discharge step should not be confused with the repeated charge/discharge cycles that occur during the normal operation of a capacitor (Br. 4), that it would not have been obvious to use the charging/discharging schemes of Neat and Anani to prepare an electrical double layer capacitor (Br. 7), and that Anani fails to describe or suggest charging at a constant current density and an increasing voltage as required by claim 10 (Reply Br. 2).

The Examiner responds that page 33 of the Specification was not relied upon as evidence that the charge/discharging step was known in the

[1] During the hearing held on August 13, 2008, Appellants' representative attempted to argue that the prior art failed to teach or suggest the porosity limitations within the step of preparing the carbon fibers, however, as those arguments were not advanced in the Briefs, we do not consider them. *See* 37 C.F.R. § 41.47(e)(1) (2006).

art, rather, the Examiner took Official Notice of this fact (Ans. 4). The Examiner also contends that a 3 V treatment is taught by Maeda and the claims do not exclude charging/discharging during normal use (Ans. 4). The Examiner also argues that the supporting references teach charging/discharging at constant current (Ans. 4).

The issue on appeal arising from the contentions of Appellants and the Examiner is: have Appellants established that the Examiner reversibly erred in finding that the applied prior art would have suggested to one of ordinary skill in the art performing a charge/discharge treatment meeting the requirements of claim 10?

In addressing this issue, the following Findings of Facts (FF) are particularly relevant:

1. According to the Specification, the mesophase pitch based active carbon fiber obtained in the activation step is formed directly, or after being mixed with a binder, into electrodes and "the charging and discharging are carried out so that the charge and discharge treatment of the active carbon fibers is effected." (Spec. 27:19 to 28:2.)
2. In the charge/discharge treatment, according to the Specification, charging increases the potential difference between the electrodes from 0 V to over 2.5 V, especially preferably 3.5 V, so as to allow the current density to be constant. The voltage is maintained until a stable state is reached and, thereafter, discharging is conducted at constant current density (Spec. 28:3-13).

3. Charging and discharging results in a discharge curve that can be used to calculate the discharge capacity of the electrodes (Spec. 30:3-7).

4. The Specification discloses that the carbon fibers within Appellants' capacitors exhibit "a marked effect of increasing charge and discharge capacities in the change and discharge treatment step (III)." (Spec. 30:21 to 31:7.)

5. Although a second charge/discharge treatment results in increases in capacity that are not as high, substantially constant high capacities can be maintained thereafter under regular charging and discharging conditions (Spec. 31:7-14).

6. The Specification does not disclose the specific conditions of a "regular" charging and discharging cycle (Spec. in its entirety).

7. The Specification contains no definition of "charge/discharge treatment" (Spec. in its entirety).

8. Maeda describes a method of preparing electric double layer capacitors by fashioning electrodes from activated mesophase pitch carbon fibers, binder, and conductive acetylene black and placing the electrodes and a conventional separator in a casing and pouring an electrolytic solution into the casing (Maeda, col. 1, ll. 7-10; col. 4, ll. 22-38; col. 9, l. 47 to col. 10, l. 10; col. 11, ll. 1-9).

9. Maeda disclose using an organic solvent type electrolytic solution, and that when this type of electrolyte is used "the voltage of the electric double layer capacitor can be increased to at most about 3 V" as opposed to capacitors using aqueous solution type electrolytic

solutions which can be increased to barely about 1 V (Maeda, col. 10, ll. 50-60).

10. Maeda determines the discharge capacity of the electric double layer capacitor by a "constant-current discharge method" to determine the discharge capacity (Maeda, col. 11, ll. 45-56).

11. In the examples, Maeda determines the discharge capacity by charging the capacitors to a voltage of 2.0 V and then discharging (Maeda, col. 12, ll. 64-67).

12. It was known to charge capacitors by applying a constant current to one of the electrodes (*see, e.g.*, Anani, col. 4, ll. 28-32); however, current and voltage can be varied during some charging schemes (*see, e.g.*, Anani, col. 4, ll. 33-36).

Because claim interpretation normally controls the rest of the decision making process, every analysis must begin with the key legal question: what is the invention claimed? *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561 (Fed. Cir. 1987). During examination, "claims . . . are to be given their broadest reasonable interpretation consistent with the specification, and . . . claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of

underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 ("While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls."). An obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR*, 127 S. Ct. at 1741.

Applying the preceding legal principles to the Factual Findings in the record of this appeal, we determine that the Examiner has established a prima facie case of obviousness.

Appellants' argument that the charge/discharge treatment step should not be confused with the repeated charge/discharge cycles of normal capacitor operation brings up an issue of claim interpretation. The question is: does the charge/discharge treatment step of claim 10 necessarily exclude the charge/discharge that occurs during the normal operation of a double layer capacitor?

We determine that the claim does not necessarily exclude charge/discharge occurring normal operation. In fact, the step encompasses any charge/discharge treatment meeting the operational parameters of the claim. There is nothing in the Specification defining the charge/discharge treatment in a way that excludes the cycles of normal capacitor charge and discharge or for that matter a charge/discharge treatment used to determine

discharge capacity (FF 1-7). As long as the capacitor is charged according to the current and voltage parameters of the claim so that an electric double layer is formed and discharging occurs according to the current requirements recited in the claim, the limitation is met.

Maeda describes a method of preparing a double layer electrode and further discloses a step of determining the discharge capacity by a "constant-current discharge method" (FF 8 and 10). The constant-current discharge method involves charging at some current density until a particular voltage is reached to form a electric double layer as claimed and discharging at a constant current density. While Maeda discloses examples that charge to only 2 V (FF 11), Maeda discloses that when organic solvent type electrolyte is used as the electrolyte, the capacitor can be charged up to about 3 V. Moreover, while Maeda is silent with respect to the nature of the current applied to charge the capacitor, applying a constant current was known in the art as evidenced by Anani (FF 12). The fact that Anani also describes that in some charging schemes current can be varied (FF 12) does not negate the teaching that constant current application was known in the art. The evidence supports the Examiner's conclusion of obviousness.[2]

Appellants have not established that the Examiner reversibly erred in finding that the applied prior art would have suggested to one of ordinary skill in the art performing a charge/discharge treatment meeting the requirements of claim 10.

[2] A discussion of Neat is not necessary to our decision.

Claim 11

With respect to claim 11, Appellants again focus their arguments on the last step of the process, i.e., the step, as presented by Appellants, of "placing the activated fiber in an electrolyte and applying the current while increasing voltage such that an electric double layer is formed at the interface of the activated fiber and the electrolyte, and then effecting a discharge" (Br. 8-9). Appellants' arguments parallel those made with respect to claim 10 (Br. 8-11).

We note that claim 11 is similar to claim 10 except broader in scope. For instance, claim 11 does not expressly require the carbon fiber be used to form positive and negative electrodes. Claim 11, however, does not exclude electrode formation. For the reasons provided in our discussion of more narrowly drawn claim 10, we determine that the evidence supports the Examiner's conclusion that it would have been obvious to one of ordinary skill in the art to charge the fibers within Maeda's electrodes to up to 3 V, a voltage taught by Maeda as achievable, by applying a constant current density, such constant current density charging being known in the art as evidenced by Anani, to form an electric double layer at an interface of the fibers within the electrode and the electrolyte of Maeda's capacitor and discharging the capacitor at a constant current density according to Maeda's constant-current discharge method.

Appellants have not established that the Examiner committed a reversible error in rejecting claim 11.

III. CONCLUSION

Based on the above, we sustain the rejection of claims 10-22 under 35 U.S.C. § 103(a).

IV. DECISION

The decision of the Examiner is affirmed.

V. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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